BLOOD PRESSURE

Blood pressure is the force of circulating blood against artery walls. This pressure helps deliver oxygen and nutrients throughout the body. It depends on how much blood the heart pumps, the resistance encountered in blood vessels, and the volume of circulating blood. Blood pressure naturally changes with activity, sleep, emotions, and body position; it is not a fixed number. A reading contains two numbers. Systolic pressure, the upper number, measures arterial pressure when the heart's ventricles contract and push blood outward. Diastolic pressure, the lower number, measures pressure between beats, when the heart relaxes and refills. Elastic arteries help maintain blood flow during this resting phase. Readings are in millimeters of mercury, abbreviated mmHg, a pressure unit from traditional mercury-based instruments.

HOW THE BODY REGULATES PRESSURE

The heart adjusts its rate and the amount of blood pumped with each beat. Small arteries called arterioles change their diameter: narrowing increases resistance, while widening reduces it. Arterial elasticity also matters. Stiffer arteries expand less easily and can contribute to higher systolic pressure. The nervous system provides rapid adjustments. Baroreceptors, stretch-sensitive sensors in major arteries, detect pressure changes and signal the brain. The brain then adjusts heart activity and blood vessel tone through the autonomic nervous system, which controls functions outside conscious awareness. This helps maintain circulation during changes such as standing up. The kidneys provide longer-term regulation by adjusting sodium and water excretion. When kidney blood flow falls, the renin–angiotensin–aldosterone system can become activated. This hormone pathway narrows blood vessels and increases sodium retention, which helps retain water and restore blood volume. Vasopressin also promotes water conservation, while adrenaline can rapidly increase heart activity and alter vessel tone.

BLOOD PRESSURE CATEGORIES

Under current U.S. adult guidelines, normal pressure means systolic below 120 and diastolic below 80 mmHg. Elevated pressure means systolic 120–129 with diastolic below 80. Stage 1 hypertension means systolic 130–139 or diastolic 80–89. Stage 2 hypertension means systolic at least 140 or diastolic at least 90. When the numbers fall into different categories, the higher category applies. These categories describe resting measurements; hypertension generally requires a pattern of elevated readings rather than one isolated result.

TEMPORARY VARIATIONS

Exercise, pain, anxiety, caffeine, nicotine, a full bladder, and some medications can temporarily raise pressure. Sleep patterns, kidney function, hormones, genetics, and age can influence longer-term levels. Cuff size, talking, arm height, and unsupported posture can also distort measurements. White-coat hypertension describes elevated readings in a clinical setting with normal readings elsewhere. Masked hypertension describes the reverse. Repeated measurements and readings outside the office help distinguish these patterns.

PERSISTENT ELEVATION

Persistently elevated pressure places extra strain on artery walls and increases the heart's workload. Over time, it can damage blood vessels and contribute to heart disease, stroke, kidney disease, and vision problems. Hypertension often causes no obvious symptoms, making measurements more informative than how someone feels.

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